DOCUMENT RESUME

ED 035 363 HE 001 301

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TITLE	The Role and Structure of Interdisciplinary and Multidisciplinary Research Centers.
INSTITUTION	Council of Graduate Schools in the U.S., Washington, D.C.
PUB DATE	5 Dec 69
NOTE	9p.: Address to the Ninth Annual Meeting of the Council of Graduate Schools in the U.S., Washington, D. C., December 4-6, 1969
EDRS PRICE	EDRS Price MF-$0.25 HC-$0.55
DESCRIPTORS	*Administration, Administrative Policy, *Higher Education, *Interdisciplinary Approach, *Research and Development Centers, Research Methodology, *Social Problems, Social Responsibility
IDENTIFIERS	*Interdisciplinary Centers

ABSTRACT

Although innumerable interdepartmental institutes, centers, and laboratories have been established on US campuses since World II, they have been largely ineffective and unproductive. There are 3 distinct types: (1) the crossdisciplinary centers, in which researchers with problems in one discipline seek new methodologies, solutions or problems from another discipline; (2) the multidisciplinary centers in which individual scholars from different disciplines share common facilities, a common research approach or a common environment, but each works on problems posed by his own discipline; (3) the interdisciplinary centers where the problem determines the selection of personnel involved in a given project. The different centers vary greatly in their use of graduate students and administrative requirements. Most universities have established multidisciplinary centers which essentially serve the departments. If the university wants to address itself to today's problems, it must establish interdisciplinary centers which are administered, staffed, and run very differently from those of the present. (AF)

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THE ROLE AND STRUCTURE OF INTERDISCIPLINARY AND MULTIDISCIPLINARY RESEARCH CENTERS

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Since World War II the interdepartmental center has become a marked feature of the university landscape. In a typical graduate college catalogue one may see references to dozens of different institutes, centers and laboratories which cut across the usual departmental and college lines. We have institutes for Asian, Medieval, Linguistic or Bio-Engineering studies; we have laboratories of Astro-Physics, Survey Research, Electron Microscopy, or Materials Research; we have centers for Computer-based Education, Space Science and Environmental Science. Based on the catalogues and brochures, it would seem that interdepartmental or cross-departmental organizations were well established within the university framework.

However, when one asks knowledgeable people about the effectiveness, productivity or institutional value of such efforts, we get very mixed reactions; appraisals vary from "qualified success" to "unqualified failures." Only a very small number of such centers have become truly distinguished focal points for interdisciplinary activities. It is the objective of this paper to make some observations concerning the differing functions of such centers, and thereby to provide a framework for the discussion of their structure and governance.

I think it is essential at the outset to recognize that the educational objectives and institutional functions of various centers may be radically different from each other and are typically very different from those for departments. To clarify this situation, we should distinguish between at least three different categories of organizations and I propose to use different semantic labels to sharpen this distinction.

HE001301

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I will not discuss in detail a possible fourth category that has grown up on some campuses: the one-man center, set up to accommodate an individualistic staff member who, whatever his other qualifications, typically has unique entrepreneurial skills in Washington. This "center" for the academic fish who is simply too big to fit into any departmental pond may have value, but it is too specialized for further consideration here.

The first general category of activities, which I will somewhat arbitrarily label "cross-disciplinary", is that in which a new field of graduate research develops in the overlapping territory between two or more adjacent disciplines; for example, biology and chemistry, or geology and physics. Cross-disciplinary laboratories are typically initiated by researchers with problems in one discipline seeking new methodologies or solutions from another discipline, or persons with novel solutions seeking a new set of problems. If a significant program of cross-disciplinary research activities develops, such laboratories can be effectively incorporated into new departments such as biochemistry, geophysics, psycholinguistics, or bio-engineering. Such cross-disciplinary efforts then become the new disciplines -- indeed this is the way many of the more recently formed departments have been established.

Most of my discussion today will be devoted to the governance of two classes of centers which are quite different from departments -- these are "multidisciplinary" centers and "interdisciplinary" centers. While a sharp distinction between these terms is not conventionally made -- they are frequently used interchangeably -- I believe it is useful to use different labels to distinguish between two very different types of activities. I propose the term multidisciplinary to describe a center or laboratory in which individual scholars from different disciplines (or departments) share

common facilities, common research approaches or a common environment. Sometimes all they share in common is a "sales pitch" or a joint search for Federal funds. As an example of a center addressing a real need, a multidisciplinary materials research laboratory may include metallurgists, solid-state physicists, or solid-state chemists whose work is benefited by sharing experimental facilities as well as a congenial intellectual environment. Specialists in Oriental History, Economics, or Sociology may participate in a multidisciplinary center for Asian Research in which a key feature is an Asian Library collection. It is important to note that in either of the examples the problems tackled by a given scientist or scholar typically do not require the participation of others in reaching a solution; the individual researcher benefits from the shared intellectual environment, the joint funding or common physical facilities, but he works on problems posed by his own discipline.

An "interdisciplinary center", as I will use the term, has as its prime focus the consideration of problems which call for the insights of experts in a number of disciplines and demands an interactive joint effort to reach a solution. It is the <u>problem</u> that determines the selection of the personnel involved in a given project. If the problem is a complex one, the approach to a solution requires teams of scientists, engineers or designers from different fields of specialization. At a laboratory with which I am familiar at the University of Illinois, we tackled such problems as the design of a navigation system, an air traffic control system, or a computer-based education system. For each systems project, a different set of disciplinary backgrounds or skills was called for and a group of professionals assembled, typically under the guidance or leadership of a project head.

It is interesting to contrast the relationships with graduate students in these different environments. In the multidisciplinary laboratory, the student is assigned to a given professor (or vice versa) and relates to him as he would in his department: the problems are those considered currently valid in the discipline. In an interdisciplinary effort, on the other hand, the student selects, or is assigned, a problem in the context of a much larger group objective. He may become a key member of the group even before he writes his thesis and in the process he may relate to several senior staff members from different departments. It is easy for such a student to see the relevance of his work; from an educational viewpoint it is often necessary for his thesis advisor to protect him from too heavy an involvement and to assure that a valid thesis emerges.

The administration of these two types of centers obviously calls for different skills, different decision-making procedures, and different reward systems. In the case of a multidisciplinary center or facility, a principal objective is to serve a group of previously selected departments. Hence, an important role in governance may be delegated to a representative interdepartmental committee, i.e., representative of the departmental clients. The center "director" may act as the chairman of such a committee -- and often does. By seeing to it that all clients are adequately served, he may effectively carry out his prime function as coordinator and spokesman.

By contrast, the key administrative challenge in an interdisciplinary effort is the assembly of a group of people who can relate effectively to a problem and to each other. This involves a delicate and skillful selection process, and one in which commitments may be tentative and subject to later change. As opposed to the situation in multidisciplinary laboratories, one often cannot predict which departments may be involved, even when it is

clear what fields of disciplinary expertise are needed. If no one in the corresponding department is motivated, or qualified to contribute to the interdisciplinary effort, the project leader may have to look elsewhere for participants or even to learn the elements of the missing discipline himself. The motivation for taking part in an interdisciplinary effort differs substantially from that for a traditional academic program or a multidisciplinary laboratory. A problem-solving effort is primarily addressed not inwardly toward advancing a participant's professional standing in his discipline, but outwardly to the successful design of solutions to his problem. For all of these reasons, it should be clear that the administrative task is different; it calls for leadership rather than coordination, and it is not substantially motivated by the disciplinary reward system, so deeply ingrained in the academic scene.

From the above discussion, it should be apparent why the academic community has found it much easier to understand and to administer the multidisciplinary facility; in the final analysis, its major function is to serve the existing disciplines and departments.

It should also be apparent why existing university structures have thus far met with relatively little success in developing strong interdisciplinary efforts. Since the initiative for new programs is typically vested in departments, there have been relatively few efforts to assemble such groups, to provide them with laboratory facilities, or to assist them with the non-academic professional staffs essential to such an enterprise.

An important exception to the above statement is represented by the interdisciplinary activities established in the early days of the Colleges of Agriculture. These activities were organized in departments --

for example, a department of food science, covering activities from human nutrition to the preservation of various foods. However, for a number of reasons, I do not believe it is feasible to follow the Agricultural College pattern of using the departmental organization itself to serve this interdisciplinary function. The increasingly complex problems of today, whether agricultural or urban, call for more diversified skills, a wider distribution of sponsors and clients, and a different organizational framework.

If we are to address today's problems, we need interdisciplinary centers in which certain critical conditions are met: (1) We need an environment in which faculty members and students may commit themselves to a joint interdisciplinary effort without making a permanent organizational commitment. (2) We need a university administrative structure in which the interdisciplinary center and a variety of departments may pursue very different objectives with interim joint appointments but without subordination of one administrative structure to the other. (3) We need to develop institutional mechanisms for the selection and reward of a new breed of professional academic staff member, one who is not only willing but <u>able</u> to assume leadership roles for interdisciplinary programs and centers.

If there is one overriding staff requirement in an interdisciplinary effort, it is that <u>there be at least one person in a leadership role</u> who is an <u>interdisciplinary</u> person. And we must recognize that the academic community in its traditional time-honored mold has not addressed itself to the training or education of the interdisciplinary man. A recognized scholar who has devoted his life's career to selecting and solving problems which are tractable by the methods of a single discipline has probably been getting negative experience for addressing problems which in their usual context are either intractable or only partially susceptible to such methods of attack.

(Appx 17)

If we want true interdisciplinary leaders on our campus -- we need a new set of procedures by which to select them, a new set of standards by which to judge them and a new set of criteria by which to reward them. Under existing structures, we often have no mechanism for hiring such a person if we find one! In most departments, a Charles Hitch, a John Gardner or a John Lindsay would not have the appropriate credentials to be considered a candidate for a tenure position.

How can we provide a structure in which departments and interdisciplinary centers can be compatible? It seems to me that the department should, by and large, be considered the instructional and degree-granting academic unit of the university, while the responsibility and authority for building a problem-oriented team should reside within the interdisciplinary center. A member of the academic staff of an interdisciplinary laboratory should typically have an appointment, let us call it a "tenure appointment", in one of the academic departments. He should typically not have established tenure within the laboratory.

As to the decision-making process within the laboratory, it should best be made in a framework of accountability rather than participatory democracy. I am here using Kingman Brewster's use of the terms; the notion of accountability is particularly applicable to the role of director of an interdisciplinary laboratory. Such a director must clearly have the confidence of the people within his laboratory and he must play a role which is ultimately accountable to them. The interdisciplinary administrator depends on his ability to lead, and not on his vested authority, since any academic member of his laboratory should always have the graceful option of returning to his tenure department. However, there are few better ways to assure failure than to subject the director's decisions to veto by a

representative committee. Needless to say, this is a completely different administrative environment from the one typically found in a department.

In a departmental structure, when we recruit a young man to a given discipline, we assume that his professional research interests will parallel those of the department for forty years. All too often a true interdisciplinary person will have professional interests which do not parallel the program of any one department. Hence, the entire concept of tenure either for the laboratory director or for the key leadership within the program must be reconsidered. It may be necessary to establish a new category of academic personnel. One proposition which deserves serious consideration is the concept of an <u>all-university professor without tenure</u>. The appointment of such a person might be reconsidered on some periodic basis; perhaps a seven-year term would be a suitable one. After one or two terms of office, the director of such a program might well consider an interim appointment in an academic department, <u>if they would have him</u>; some of the most successful leaders of mission-oriented laboratories have returned to academia for limited periods of time to renew their intellectual skills or to acquire new perspectives.

Others on this panel have addressed their attention to the various reasons for establishing interdisciplinary and multidisciplinary research centers. While there are other reasons for doing so, it is my opinion that the prime impetus for giving more serious attention to interdisciplinary efforts lies in the growing recognition of a need for new approaches to the study of problems posed by our society. It is the increasing complexity of the world in which we live and the insistent demands to study the problems posed by that real world that brings urgency to the topic we are discussing today.

Glenn Seaborg recently placed the problem in a larger context: "Over the next few decades -- before the end of this century -- mankind will have to face and resolve challenges that may well determine the shape of its life for centuries to come, if not its very survival." Some have argued that other types of institutions should be engaged in the intellectual effort addressed to such problems. Industry, possessed of some of the most competent administrators and leadership talent, has addressed itself to problems of productivity and distribution, problems which today seem small by comparison with the problems of human survival. Alvin Weinberg, calling attention to the mismatch between the discipline-oriented structure of the university and the mission-oriented nature of the problems posed by society, has suggested that certain not-for-profit laboratories, such as the National Laboratories of the Atomic Energy Commission, should be relied on to work on such problems. Whether the university is capable of making an important contribution depends not on whether the public is ready to support it or whether students will be willing to participate, but on whether the institution is capable of changing its values and structure in order to do so. Perhaps as an alternative, we should consider the possibility of new institutional relationships, to relate more closely the efforts of universities, not-for-profit national laboratories, and industrial laboratories.

I recognize, of course, that we have not as yet reached a consensus as to how, or even whether, the university should play a significant role in addressing the problems posed by society. I think I have already revealed my own bias on this question. I believe the university must address itself to the major problems posed by society not because society will not survive if we fail to come up with solutions, but because the university will not survive if we cannot persuade our students and the public at large that we are seeking to understand such problems.